sustainability

MDPI

Article

Research on Sustainability Financial Performance of Chinese Listed Companies

Feng Wei [1,*], Jiawei Lu [1] and Yu Kong [2]

[1] Department of Finance, School of Economics and Business Administration, Chongqing University, 174 Shazhengjie, Shapingba, Chongqing 400030, China; 20160202007@cqu.edu.cn

[2] Department of Public Economics , School of Public Affairs, Chongqing University, 174 Shazhengjie, Shapingba, Chongqing 400030, China; kongyu@cqu.edu.cn

* Correspondence: wfmx@cqu.edu.cn; Tel.: +86-23-65105291

Academic Editor: Andrea Appolloni

Received: 22 March 2017; Accepted: 26 April 2017; Published: 30 April 2017

Abstract: Studying the sustainability of the financial performance of Chinese listed companies is an assessment of their future development capability and a comprehensive evaluation of all aspects of the companies over the past period of time. Based on the financial data of manufacturing industry of Chinese listed companies from 2008 to 2015, this paper uses the AHP (Analytic hierarchy process) method to determine the weight of each secondary indictor, calculate the sustainable development capability of financial performance, and analyze and compare the sustainable financial performance of manufacturing sub-industries. The long-term trend and the periodical trend of the sustainable development of the manufacturing industry in Chinese listed companies are analyzed through the HP (High-Pass) filter method. The results show that the long-term sustainable financial performance of the manufacturing industry of Chinese listed companies is basically maintained. Through the comparison of regions and ownership, it has been found that the sustainable financial performance of Chinese listed companies in the eastern and central regions is rising, while that of the western region is declining; the long-term sustainable financial performance of non-state-owned enterprises is rising, while that of state-owned enterprises is declining.

Keywords: manufacturing industry; sustainable financial performance; AHP method; HP filter method

1. Introduction

In recent years, China's GDP growth rate has gradually declined. The economy has changed from high-speed growth to mid-high-speed growth, and this has become the new norm of economic development. In this new norm, the development of China's manufacturing industry has entered a new stage. First, China's manufacturing cost advantage has gradually been eroded, and the traditional labor-intensive manufacturing industry competitiveness has become increasingly weak; in addition, China's manufacturing industry is developing higher value products, turning "Made in China" into "Designed in China". From the perspective of the international trade situation, trapped in the global economic downturn of recent years, China's manufacturing export growth has slowed down, and even shown negative growth in some months. Therefore, it is of great significance to study the sustainable development of listed manufacturing enterprises in China.

Based on past research, Qin, Wang and Chen [1–3] and other writers believe that to study the sustainable performance is the key to studying the sustainable development of Chinese listed companies. At present, although there is much relevant literature studying the sustainable development of Chinese listed companies, the sustainable financial performance of China's manufacturing in these listed companies is still worth further study. Although professional managers can improve the firms' performance facing the economic environment, social environment and other pressures, they may not

totally understand firms' long-term sustainable development capability, and they also need to explore the comparison of the sustainable development capability of performance among different industries, different regions, and under different ownership.

This paper introduces the evaluation indictors of the sustainable development and constructs an evaluation system of sustainable financial performance; uses the AHP method to assign the appropriate weight to each indictor; and calculates the sustainable development capability of Chinese listed companies from 2008 to 2015 according to the weight and the evaluation indictor. This paper analyzes the long-term trend of the sustainable financial performance of manufacturing industry in Chinese listed companies with the HP filter method, as well as the reasons. From the perspective of industry segmentation, we compare the sustainable financial performance of sub-industries; from the perspective of regions, we compare the sustainable development capability of the eastern, central and western regions; and from the perspective of ownership, we compare the sustainable financial performance of state-owned manufacturing and non-state-owned manufacturing.

In the past decade or so, many enterprises have begun to realize that there is a need to address the enterprise's sustainable development, but there are still some controversies about the enterprise's sustainable development [4], Dyllick and Hackers [5] argue that sustainable development should meet the needs of both direct and indirect stakeholders without compromising their capability to meet the needs of stakeholders in the future. Another view of the enterprise performance sustainable development proposed by Marrewijk [6] refers to the social and environmental issues presented in business and in the interaction of stakeholders. Today's concept of sustainable development involves factors such as environmental protection, health, and work safety, which are related to the interests of local people and consumers [7]. Morioka and Carvalho [8] suggest that the sustainable development not only means long-term survival but also that the needs and interests of various stakeholders should be taken into account.

Thus far, experts and scholars have explored a great deal and contributed to the construction of the sustainable development evaluation system, but there are some drawbacks in these studies. For example, Searcy [9] examines the development of a six-step design process in his paper and uses it to guide a sustainable development evaluation system that is tailored to a particular enterprise, but this method is not universal. Ferguson [10] uses the SEEG model (social, environmental, economic, and management models) to analyze the sustainable development of enterprise performance. However, Ferguson does not measure an enterprise's social, environmental, economic, and management performance, but only illustrates and explains these indicators' meaning. The results of the relationship between environmental performance and financial performance is mixed; for instance, Sarkis and Cordeiro [11], Filbeck [12] and others believe that there is a negative relationship between environmental performance and financial performance, while Triebswett and Hitchens [13] believe that the two have a positive relationship. Tahir and Darton [14] propose another generalized model, the process analysis method, to measure the sustainable development indicators of performance. The disadvantage of this process analysis is that it is necessary to use an enterprise structure chart, and a business flow chart to analysis the process, but it is difficult to obtain these charts. Liliana [15] puts forward a theory model of corporate social responsibility and sustainable development, and argues that corporate social responsibility affects the sustainable development of enterprises through economic, social and environmental channels, but does not explain the effect of the degree of these factors on the firm's sustainable development. From the perspective of a firm's development level and scale, Xin [16] thinks that there is a hierarchy between corporate sustainable development and corporate social responsibility, and that a firm's development level and scale determine their corporate social responsibility. The principal objective of a company is sustainability performance, and then corporate social responsibility. Engen, Cristina and Constantin [17] analyze the sustainable development of enterprise performance from three aspects: environmental investment analysis, ESG (environment, society, management) practice and the dynamic characteristics of sustainable development, but they do not consider the sustainability of corporate financial performance. Tao and Tao and Xiao [18]

analyze resource-based listed enterprises' comprehensive evaluation indictors from financial, social and ecological perspectives, including 12 financial indicators, 16 social indicators, and nine ecological indicators, but these indicators are subjective evaluation indicators. Morioka and Carvalho [8] take industry differences into account when designing sustainable development indicators of performance, and construct the sustainable development evaluation system from four aspects such as specifically organizational indicators, individual employee indicators, external communication indicators and an initial project evaluation system, but they do not measure the indicators, and their paper does not consider social and environmental performance such as firms' ecological environment, corporate social responsibility. This does not demonstrate that these indicators are not important, but because of the development of Chinese manufacturing industry currently in the primary stage, firms' profit is their main target. We consider the firms' sustainability financial performance only on the basis of survival.

This paper first introduces the evaluation indictors of sustainable development and constructs an evaluation system of sustainable financial performance, and then uses the AHP method to assign the appropriate weight to each indictor, and finally calculates the sustainable development capability of Chinese listed companies from 2008 to 2015 according to the weight and the evaluation indictor. This paper analyzes the long-term trend of the sustainable financial performance of manufacturing industry in Chinese listed companies with the HP filter method. From the perspective of industry segmentation, we compare the sustainable financial performance of sub-industries; from the perspective of regions, we compare the sustainable development capability of the eastern, central and western regions; and from the perspective of ownership, we compare the sustainable financial performance of state-owned manufacturing and non-state-owned manufacturing.

There are two possible contributions in this paper. Firstly, this paper does not consider environmental and energy issues, but focuses on the firm's sustainable financial performance, which can calculate the firm's sustainable financial performance, and separate the long-term trend of firm's sustainable financial performance using the HP filter method. Secondly, due to the difference of the production and management of the manufacturing industry, location and ownership will affect the firm's sustainable financial performance. Therefore, this paper subdivides industry segments of the manufacturing sector, and compares the status of their long-term sustainable financial performance trend of each sub-industry of the manufacturing industry from the time, ownership and location perspectives; these results will promote the reform of state-owned enterprises and the coordinated development of the regional economy.

2. Literature Review

By combing previous literature, it can be seen that financial indicators can reflect the internal business situation, and the external factors of enterprises often relate to the enterprise's technology level in the industry, the enterprise living environment, etc., and sometimes even the enterprise's internal and external factors are considered. Therefore, in the construction of a sustainable development evaluation system, we shall consider three aspects: accounting performance indicators, market performance indicators, and comprehensive performance indicators.

2.1. Accounting Performance Indicators

In this paper, accounting performance indicators are mainly used to analyze the enterprise's financial situation and business performance. Higgins [19] first proposes the sustainable development from the financial point of view that the sustainable development is the largest growth rate of enterprise sales revenue in the context of rising equity financing and maintaining current operating efficiency and financial policy. Qiu [20] argues that, in the financial performance rating system based on accounting income, most of the evaluation indicators are the ratio analysis of the financial indicators, mainly including net profit and its return on equity, capital return and similar factors; in addition, DuPont Analysis can be used to comprehensively evaluate the performance of enterprise profits, management and other aspects, but this method cannot fully reflect the full benefits. Shi and He [21]

present five aspects related to accounting indicators in terms of the sustainable development of the enterprise, namely, profitability, marketing ability, solvency, management ability and anti-risk ability, which includes 11 secondary indicators to evaluate the enterprise's sustainable development. Bai [22] analyzes the financing situation of the listed enterprises from four aspects: retention rate of return, depreciation financing, equity financing and debt financing. It is considered that the sustainable development of the listed enterprises in agriculture refers to the unique core competitiveness formed through a reasonable financing structure. Cao [23] constructs two evaluation systems of sustainable development capability: one is based on the internal environment, while the other is based on financial indicators. However, in the empirical process, because financial indicators are easily accessed, the second one is usually used. To sum up, the existing literature on the selection of accounting performance indicators mainly focus on two aspects: firstly, financial indicators, such as profit margins, retention rate, etc.; and, secondly, financing situations, such as equity financing or debt financing. Table 1 shows the relevant accounting performance indicators considering previous research on the sustainable development of the enterprises' performance, as well as taking the operability and the systematic design of the evaluation indictors into account.

Table 1. Accounting performance indicators.

Secondary Indicators	Definition
Net profit margin of asset	the ratio of net profit to total asset
Total asset turnover	the ratio of gross revenue to total asset
Flow ratio	the ratio of current asset to current liability
Growth rate of gross revenue	the ratio of income growth of this year to total income at the end of last year

The above-mentioned methods use multi-indictor comprehensive analysis, but these indicators are limited to the evaluation of the enterprises' past economic benefits. Still, it is difficult to fully estimate the sustainable development of enterprises, so the market performance indicators and the comprehensive performance indicators are both studied.

2.2. Market Performance Indicators

Market performance indicators mainly refer to the enterprise development and market-related indicators, including technological innovation, business environment and enterprise value. Xu and Wu [24] establish a dynamic cumulative effect model to analyze the internal relations among the various sustainable development indicators, so as to show the continuous changes and cumulative effects of enterprise financial data. However, the article does not discuss the impact of the intangible assets and social capital on sustainable development. Yao, Yang and Zhang [25] propose innovative learning capability in constructing the indictor system of the sustainable development of the listed enterprises, including the ratio of R&D costs to sales ratio, the innovation system and innovation efficiency, and the R&D personnel ratio. Although these indicators can evaluate the enterprise's capability to learn innovation, some indicators are not quantified, so it is difficult to put into practice. Yao and Wu [26] use Tobin Q value as business performance variables in the study of the governance of the board of directors and the sustainable development of the listed enterprises, so as to analyze the impact of the board structure on the enterprise performance. The results are contingent because this method only takes excellent enterprises as examples. Ye [27] believes sustainable innovation is the only way for the enterprise to break through the enterprise life cycle, sustaining from a mature period to another mature period, and thus continuing to develop. To sum up, the existing literature on the market performance indicators are mainly innovation, Tobin Q value and similar indicators. In Table 2, according to the past literature and the current characteristics of the market, the following factors are selected as indicators of the sustainable development evaluation system. The assignment method is to calculate the score: 0 for less than the industrial average level; 1 for 0–25% higher than

the average level; 2 for 25–50% higher than the average level; 3 for 50–75% higher than the average level; 4 for 75–100% higher than the average level; and 5 for > 100% higher than the average level.

Table 2. Market performance indicators.

Secondary Indicators	Definition
Technological innovation	the ratio of intangible assets to the industrial average level
Enterprise living environment	the point of business margins to the industrial average level
Enterprise value	Tobin Q value

2.3. Comprehensive Performance Indicators

Comprehensive performance indictors mainly analyze the sustainable development of the listed enterprises from three aspects: enterprise responsibility, enterprise governance and innovation capability. The concentration of ownership is conducive to enhancing management control, as this can reduce free-rider problems [28]. Qiu [20] selects "Equity structure" to evaluate the level of the listed enterprises' governance, and believes that the second to the tenth largest shareholders are exploited by the largest shareholder. However, they have the right to participate in supervision and management, so their shareholding ratio is positively related to the enterprises' performance. Ferguson [10] proposes a pyramid of enterprise responsibility practice and value. From the bottom to the top of the pyramid, there are enterprise responsibility, core business management and operational practice, local community investment, social investment, and charity work, and he believes that these show the enterprise's responsibility and sustainable development, and every layer plays an important role in the enterprise's development [25]. Qiu [20] insists that resource, innovation and responsibility are important factors that impact on the sustainable development capability of the listed enterprises; in addition, she proposes the implementation of the responsibilities of stakeholders, including responsibility to employees, responsibility to shareholders and social responsibility. Bai [22] uses 16 evaluation indicators to construct an evaluation system for the sustainable development capability of the listed enterprises in the coal industry, and he insists that the "staff contribution rate" reflects the value distributed to all employees by the listed enterprises. The higher this indictor is, the greater the importance the enterprise attaches to its employees.

The ownership structure is the most important part of enterprise governance. On the one hand, the ownership structure reflects the basic institutional arrangement of the listed enterprises. On the other hand, the ownership structure determines the governance style to a certain extent. To sum up, the existing literature on the comprehensive performance indicators are mainly the social contribution rate, the staff contribution rate and related areas. Table 3 shows the comprehensive performance indicators proposed according to the reality.

Table 3. Comprehensive performance indicators.

Secondary Indicators	Definition
Employee contribution rate	the ratio of employee expenditure to gross revenue
Social contribution rate	the ratio of the total of income tax, profit, interest expense to gross revenue
Ownership structure	mainly the shareholder holding ratio of the second to the tenth largest shareholder

In summary, the accounting performance indicators reflect the financial situation and economic effects of enterprises; the market performance indicators reflect the competitiveness and the value of enterprises; the comprehensive performance indicators reflect the enterprise's social responsibility and its governance. Through objectively screening the importance and the relevance of indicators, an effective evaluation system can be established.

3. Experimental Section

Analytic Hierarchy Process (AHP) is a special systematic analysis method that decomposes the elements that are always related to decision-making into goals, criteria, programs, and so on. This method was created by the American operational scientist Saaty in the early 1970s, and is widely used in economic management and social decision-making.

Analytic hierarchy process for modeling mainly follows four steps:

a. Constructing an analytic hierarchy;
b. Constructing judgment matrices at all levels;
c. Consistency test; and
d. Hierarchical single permutation and hierarchical total permutation.

3.1. Constructing a Hierarchical Model

Constructing a hierarchical model is a key step in the AHP method, with only one element at the top level. First, construct evaluation indicators of sustainable development of the listed enterprises, and the sustainable development of the enterprises' performance is determined by the indicators of various levels. According to Tables 1–3, the construction of hierarchical structure is shown in Figure 1.

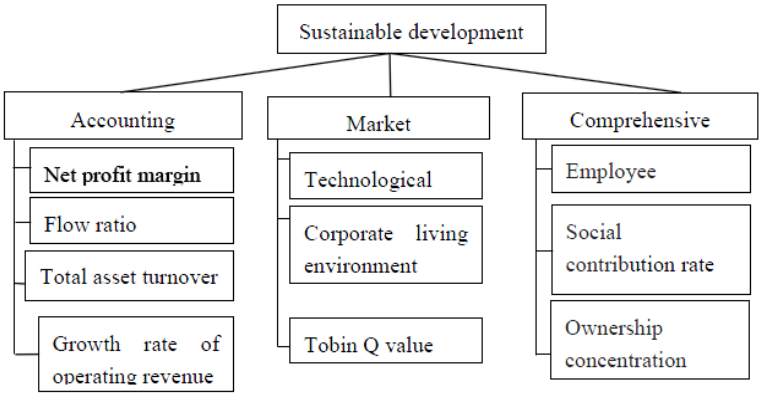

Figure 1. Hierarchical analysis.

3.2. Constructing Judgment Matrix

After the construction of the hierarchical analysis model, we need to compare the elements between two layers, to construct the judgment matrix. For n factors, by $b_i/b_j = b_{ij}$, we get the judgment matrix $B = (b_{ij})_{n \times n}$. The general form is as follows:

$$\begin{matrix} B & b_1 & \dots & b_n \\ b_1 & b_{11} & \cdots & b_{1n} \\ \vdots & \vdots & \vdots & \vdots \\ b_n & b_{n1} & \cdots & b_{nn} \end{matrix}$$

It is clear that the matrix B has the following characteristics: $b_{ij} > o$, $b_{ij} = 1/b_{ji}$, and $b_{ii} = 1$, (i = 1, 2, . . . , n). Table 4 shows the scale of the judgment matrix and its meaning. Through Table 4, the factors are compared so as to construct the judgment matrix.

Table 4. The scale of two compared elements.

C_{ij}	Description
1	Indicating that the two factors have the same importance
3	Indicating that factor i is slightly more important than factor j
5	Indicating that factor i is obviously more important than factor j
7	Indicating that factor i is significantly more important than factor j
9	Indicating that element I is extremely important than element j
2,4,6,8	Indicating that the value between adjacent judgments
Reciprocal	When the importance ratio of factor i to j is b_{ij}, the ratio of factor j to i is $1/b_{ij}$

3.3. Consistency Test

After constructing the judgment matrix, it is necessary to calculate the relative weight of each element according to the judgment matrix. We call these positive and negative matrices. If any I, j, k conforms to $b_{ij} \times b_{jk} = b_{ik}$ in the positive and negative matrix B, the matrix is a consistent matrix. When solving actual problems, the judgment matrix is not necessarily consistent, only the consistency test is effective, so it is necessary to conduct the consistency test. The steps to test the consistency of the matrix are as follows.

3.3.1. Calculate the Consistency Indictor CI

In matrix B, $B\mathbf{X} = \lambda\mathbf{X}$, λ is the eigenvalue of the matrix, and in all $b_{ii} = 1$, thus

$$\sum_{i=1}^{n} \lambda_i = n$$

where n is the order of the matrix. When the matrix is exactly the same, $\lambda_1 = \lambda_{max}$, the remaining eigenvalues are 0. When the matrix B does not have complete consistency, $\lambda_{max} > n$, the relationship between the remaining eigenvalues is:

$$\sum_{i=2}^{n} \lambda_i = n|\lambda_{\max}$$

Therefore, when the judgment matrix is not exactly the same, the corresponding judgment matrix eigenvalue also changes, so the introduction of a consistency indictor CI is necessary. The larger the CI value is, the greater the deviation of the judgment matrix is; conversely, the smaller the CI value is, the better the consistency of the judgment matrix is. When the matrix shows a complete consistency, λ_{max} tends to n and CI is equal to 0.

3.3.2. Find the Average Consistency Indicator RI

Table 5 shows the average consistency indictors at different orders.

Table 5. The average consistency indictors.

n	1	2	3	4	5	6	7	8	9	10	11	12
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.54

3.3.3. Calculate the Random Consistency Ratio CR

When CR = CI/RI < 0.1, the judgment matrix has satisfactory consistency, otherwise it is necessary to readjust the judgment matrix.

3.4. Hierarchical Single Permutation

The judgment matrix A is constructed by the comparison of two factors, and the eigenvector corresponding to the maximal eigenvalue λ max is W. The vector is normalized to the weight of the importance of the same level factor to the previous level factor. This process is the hierarchical single permutation.

3.5. Hierarchical Total Permutation a_i b_{ij}

Hierarchical total permutation can be viewed as a combination of the hierarchical single permutation. If level A contains k factors, the weight of the hierarchical single permutation of matrix A is $a_1 \ldots a_n$. The weights of the hierarchical single permutation of level B on the previous level are $b_{11} \ldots b_{nj}$. Calculate the total weight of each factor c_i :

$$ci = \sum_{j=1}^{n} a_i b_{ij}$$

Finally, calculate if the total permutations pass the consistency test, and the random consistency ratio of the total permutations is:

$$CR = \frac{\sum_{i=1}^{n} CI\ a_i}{\sum_{i=1}^{n} RI\ a_i}$$

When CR < 0.1, the results of the total permutation show satisfactory consistency, otherwise it is necessary to readjust the judgment matrix. Through the methods mentioned above, the judgment matrices A, B1, B2 and B3 are constructed and all of them pass the consistency test.

$$A = \begin{bmatrix} 1 & 3 & 2 \\ \frac{1}{3} & 1 & \frac{1}{2} \\ \frac{1}{2} & 2 & 1 \end{bmatrix}$$

λ_{max} = 3.0092, the corresponding eigenvector after the normalization is W = (0.5396, 0.1634, 0.297) ^{T}.

$$B1 = \begin{bmatrix} 1 & 3 & 2 & 2 \\ \frac{1}{3} & 1 & \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & 2 & 1 & 1 \\ \frac{1}{2} & 2 & 1 & 1 \end{bmatrix}$$

λ_{max} = 4.0104, the corresponding eigenvector after the normalization is α_1 = (0.4235, 0.1223, 0.2271, 0.2271)^{T}.

$$B2 = \begin{bmatrix} 1 & 4 & 2 \\ \frac{1}{4} & 1 & \frac{1}{2} \\ \frac{1}{2} & 2 & 1 \end{bmatrix}$$

λ_{max} = 3, the corresponding eigenvector after the normalization is α_2 = (0.5715, 0.1428, 0.2857)^{T}.

$$B3 = \begin{bmatrix} 1 & 3 & 4 \\ \frac{1}{3} & 1 & 2 \\ \frac{1}{4} & \frac{1}{2} & 1 \end{bmatrix}$$

λ_{max} = 3.0183, the corresponding eigenvector after the normalization is α_3 = (0.625, 0.2385, 0.1365)^{T}.

The total weight of the secondary indictors can be calculated, which is as shown in Table 6.

Table 6. The total weight of secondary indictors.

Primary Indictors / Secondary Indictors	a_1 (0.5396)	a_2 (0.1634)	a_3 (0.297)	Total Weight c_i
b11	0.4235			0.2285
b12	0.1223			0.0659
b13	0.2271			0.1225
b14	0.2271			0.1225
b21		0.5715		0.0934
b22		0.1428		0.0233
b23		0.2857		0.047
b31			0.2385	0.0708
b32			0.625	0.1856
b33			0.1365	0.0405

4. Results and Discussion

In Section 3, the AHP method is used to weigh the sustainable development indictors of each performance indictor to obtain the weights of each indictor in the sustainable financial performance evaluation system. Select all the evaluation indicators in Tables 1–3 of all the 1861 in Chinese listed companies from 2008 to 2015, excluding companies with defective financial data (data missing for two years or more) and abnormal value (more than 2), and the total is 1131. Use the interpolation method for the data absence of a year, and use Winsorize for abnormal value; 730 listed companies are left. The data are from CSMAR.

4.1. The Long-Term Trend of Sustainable Development of Manufacturing Performance

Use the average annual value of the indicators of 730 manufacturing industries in Chinese listed companies to represent the entire manufacturing industry, and calculate the final score of the sustainable financial performance through the indictor weight obtained in Section 3. The results are shown in Table 7.

Table 7. Score the sustainable financial performance from 2008 to 2015.

Years	Score (Capability)	Years	Score (Capability)
2008	0.5214	2012	0.4966
2009	0.5549	2013	0.5143
2010	0.6225	2014	0.5303
2011	0.5387	2015	0.5773

Using HP filter method to analyze the sustainable financial performance in Chinese listed companies; the annual data are selected, so take $\lambda = 100$, and the original time series is divided into a long-term trend sequence and a periodic sequence. Set the comprehensive score of the sustainable financial performance in Chinese listed companies as SP. The results using Eviews 7.0 (IHS Global INC, Englewood, CO, USA) are shown in Figure 2. (The following table number omits 0, such as .64 stands for 0.64).

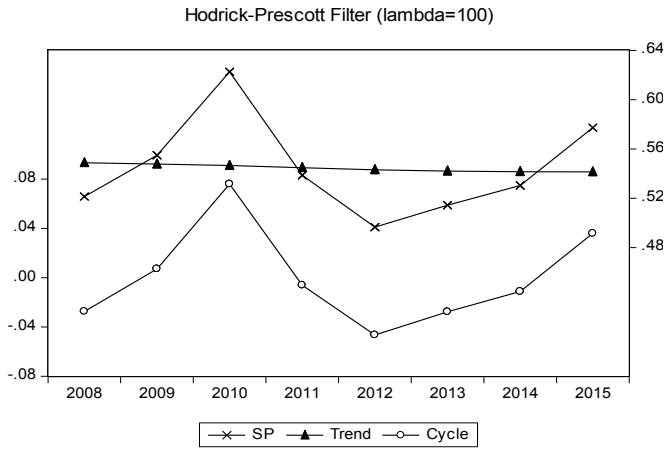

Figure 2. HP Filter depositions.

The line with ▲ indicates the long-term trend line; the line with × (SP) stands for the comprehensive score of the sustainable financial performance from 2008 to 2015; and lowest curve stands for the periodic trend line. It can be seen that the capability of sustainable financial performance has not shown a stable dynamic change since 2008, but fluctuated around the trend curve. Separating the long-term trend of sustainable financial performance can eliminate the influence of periodical factors to objectively reflect the future changes of the enterprise. The long-term trend of the sustainable financial performance in Chinese listed companies indicates a trend of slow decline, which shows that there is room for the sustainable financial performance in Chinese listed companies to be improved. There are two threats to China's manufacturing industry: Western developed countries propose a re-industrialization strategy, so the backflow of high-end manufacturing industry cannot be avoided; and the increase in China's labor costs drives labor-intensive industries to Southeast Asia [29]. Therefore, industrial upgrading and industrial transfer are two ways to enhance the sustainable development of China's manufacturing industry.

4.2. Comparative Analysis on Sub-Industries

According to the 2001 SFC industry classification standards, the manufacturing industry can be divided into 10 categories. The 730 listed companies are categorized according to the above standards (for detailed classification, see the note below Table 8). According to the weight of relevant indicators in Table 6, the sustainable financial performance of 10 categories from 2008 to 2015 can be calculated. Table 8 shows the scores of the sustainable financial performance of 10 categories from 2008 to 2015. It indicates in the table that the sequence of the sustainable financial performance is Pharmaceuticals and Biologicals > Foods and Beverages > Other Manufacturing > Electronics > Machinery, Equipment, Instrumentation > Textile, Clothing, Fur > Oil, Chemicals, Plastics > Timber and Furniture > Printing and Printing > Metals and Nonmetals. Among these, Pharmaceuticals, Biotech, Foods, Beverages, Other Manufacturing, and Electronics are higher than the industry average value and the other sub-industries are lower than the industry average value. The report from www.chyxx.com shows that the driving force for the development of the pharmaceutical industry mainly consists of government investment and policy support, the increase in income levels, aging and the increase in prevalence [30]. For Pharmaceuticals and Biologicals, according to China's industrial information network report, the driving forces for the development of the pharmaceutical industry are mainly government investment and policy support, the increase in income levels, aging and the increase in prevalence. In addition, according to the report released by *Chinabgao*, numerous but not high-tech metal products are made in China, which suggests that there is still a certain gap from the advanced level; most of China's metal products are low-level products, and high value-added products

still need to be imported, so there is still room for the sustainable development of the metal industry to be improved.

Table 8. The score of the sustainable development of sub-industries' performance from 2008 to 2015.

	2008	2009	2010	2011	2012	2013	2014	2015	Average
C0	0.5977	0.6708	0.7270	0.6513	0.6195	0.6180	0.6294	0.7079	0.6527
C1	0.4887	0.4990	0.5501	0.5490	0.4649	0.4920	0.4978	0.6238	0.5207
C2	0.4150	0.4989	0.4777	0.4072	0.4252	0.4775	0.4655	0.5083	0.4594
C3	0.4566	0.4278	0.4510	0.4188	0.3922	0.4384	0.4195	0.5141	0.4398
C4	0.4894	0.4773	0.6181	0.4741	0.4475	0.4383	0.4680	0.5238	0.4921
C5	0.5394	0.6366	0.6783	0.5889	0.5663	0.5924	0.6510	0.6788	0.6165
C6	0.4206	0.4132	0.4829	0.4224	0.3640	0.4134	0.4238	0.3953	0.4169
C7	0.5065	0.5530	0.6099	0.5155	0.4612	0.4827	0.4962	0.5445	0.5212
C8	0.7219	0.8050	0.8378	0.7851	0.7612	0.7662	0.7802	0.8268	0.7855
C99	0.6586	0.6289	0.6942	0.6589	0.6291	0.5526	0.5235	0.6409	0.6233

Note: C0, Foods and Beverages, a total of 57; C1, Textile, Clothing, Fur, a total of 39; C2, Wood and Furniture, a total of 8; C3, Paper and Printing, a total of 23; C4 For Oil, Chemicals, Plastics, a total of 129; C5, Electronic, a total of 59; C6, Metal and Nonmetals, a total of 112; C7, Machinery, Equipment, Instrumentation, a total of 217; C8, Pharmaceuticals and Biologicals, a total of 80; C99, Other Manufacturing, a total of 6.

4.3. Regional Comparative Analysis

Due to geographical factors, resource endowments, the development strategies of local government and other factors [31], there are significant differences in China's regional economies. Therefore, the 730 listed companies are divided according to eastern, central and western regions in this paper: 428 in the eastern region, 161 in the central region, and 141 in the western region. According to the relevant indicators in Table 6, we have calculated the sustainable financial performance of the listed companies in these three regions of China from 2008 to 2015. Figures 3–5, respectively, show overall changes, long-term trends and periodical trends of the total sustainable financial performance of manufacturing industry in the listed companies from 2008 to 2015 of the eastern, central and western regions by using the HP Filter method in Eviews7.0.

The line with × in Figure 3 shows the sustainable development capability of the listed companies in the eastern region from 2008 to 2015. It can be seen in Figure 3 that the sustainable development capability of the listed companies in the eastern region increases, decreases and increases again, fluctuating significantly. It can be seen in Figure 3 that the long-term trend line of the development capability of the manufacturing industry in the eastern region is gradually rising, which shows that the sustainable development capability of the manufacturing industry in the listed companies in the eastern region is strong and has good development prospects. (Note: The following table number omits 0, such as .64 stands for 0.64).

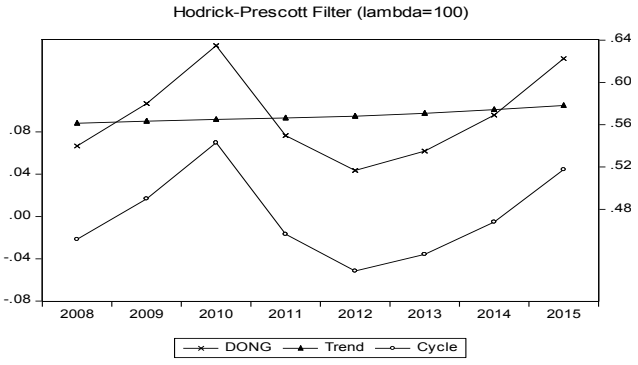

Figure 3. HP Filter depositions in the eastern region.

The line with × (ZHONG) in Figure 4 shows the sustainable development capability of the listed companies in the central region from 2008 to 2015. It can be seen in Figure 4 that the sustainable development capability of the listed companies in the eastern region increases, decreases and increases again; the fluctuation between 2009 and 2011 is stronger; and there has been a steady rise after 2012. It can be seen in Figure 4 that the long-term trend line of the sustainable financial performance of the central region is rising at a certain speed. Compared with Figure 3, it is found that the growth rate of the long-term trend of the sustainable development capability in the central region is higher than that in the eastern region, which indicates that manufacturing industry in the central region is growing and has great potential for development. The gap between the eastern and central manufacturing industries will be narrowed. (Note: The following table number omits 0, such as .60 stands for 0.60).

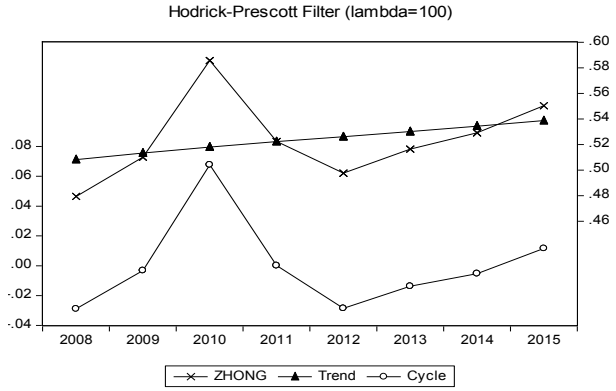

Figure 4. Filter depositions in the central region.

The line with × (XI) in Figure 5 shows the sustainable development capability of the listed companies in the western region from 2008 to 2015. It can be seen in Figure 5 that the sustainable development capability of the listed companies in the western region increases, decreases and increases again, and declined from 2010 to 2015. It can be seen that the long-term trend line of the sustainable development capability of the western region is gradually declining after the filter decomposition, which indicates that the sustainable development capability of the manufacturing performance in the western region is likely to decline in the future and the gap in the manufacturing industry between the eastern and the central will expand. (Note: The following table number omits 0, such as .60 stands for 0.60).

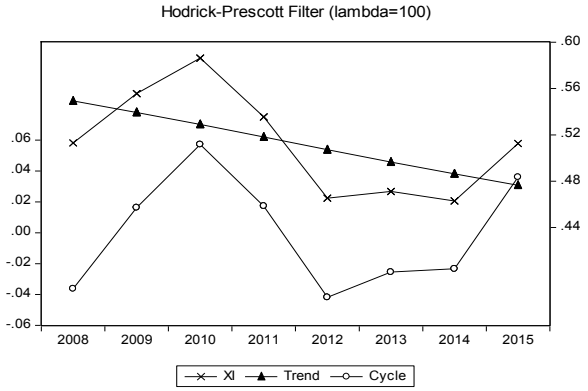

Figure 5. Filter depositions in the western region.

Table 9 shows that, on average, the sustainable financial performance of the listed companies in the eastern region is the best, while that in the western is the worst; in terms of stability, the central region is best, while the western region is still the worst. On the one hand, we can suggest that the

manufacturing industry of the central region is advancing steadily, and the gap between the eastern and central manufacturing industry will be narrowed. On the other hand, due to regional economic differences, geographical environment and other factors, the sustainable development capability of manufacturing performance in the western region may expand the gap between the central and the eastern manufacturing industry for three possible reasons: First, from the perspective of FDI, the change of FDI location is one of the important factors affecting the regional transfer of China's manufacturing industry. The empirical analysis shows that the scale of manufacturing will increase 0.260% when the average level of FDI increases by 1%. The increase of FDI penetration has a diffusion effect on the manufacturing industry in the eastern region, and a gathering effect on the manufacturing industry in the central and western regions, with the gathering effect being more significant in the central region [32]. Secondly, from the perspective of energy intensity, China's manufacturing energy intensity is quite different. The eastern coastal region is generally low, and the energy intensity of the central region is significantly higher than that of the eastern region, while that of the western region is the highest [33]. Thirdly, from the perspective of market segmentation, the most significant impact on the eastern region is international segmentation and geographical segmentation; the most significant impact on the central is geographical segmentation; and the most significant impact on the western region is terrain segmentation [34].

Table 9. Description of the sustainable financial performance from 2008 to 2015.

	Maximum	Minimum	Average	Std. Dev.
The eastern region	0.6348	0.5167	0.5648	0.0375
The central region	0.5858	0.4795	0.5227	0.0296
The western region	0.5863	0.4629	0.5128	0.0422

4.4. Comparative Analysis on Ownership

The state-owned economy dominates China, and is the lifeblood of China's economy. Analyzing the sustainable financial performance with different ownership is conducive to coming up with new ideas to improve the sustainable development of enterprises. The 730 listed manufacturing enterprises are divided into state-owned enterprises and non-state-owned enterprises according to the nature of the actual controllers: 368 are the state-owned enterprises, while 362 are non-state-owned enterprises (non-state-owned enterprises mainly include private enterprises and personal enterprises). Figures 6 and 7, respectively, show changes in the sustainable financial performance of state-owned enterprises and non-state-owned enterprises from 2008 to 2015 after the HP filter decomposition. Table 9 is a statistical description of the sustainable financial performance of state-owned enterprises and non-state-owned enterprises. (Note: The following table number omits 0, such as .56 stands for 0.56).

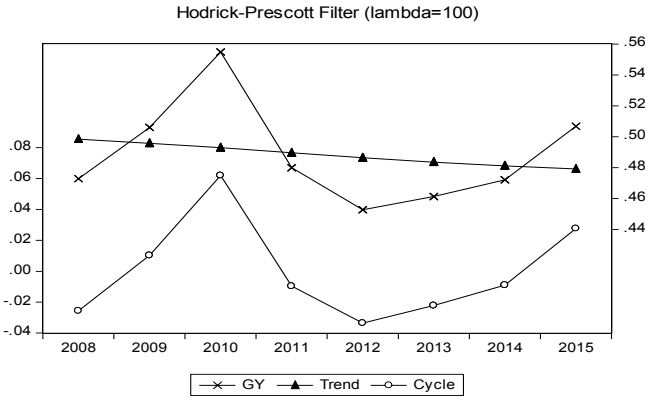

Figure 6. Filter depositions of state-owned enterprises.

The line with × (GY) in Figure 6 shows the sustainable financial performance of state-owned enterprises from 2008 to 2015. It can be seen in Figure 6 that the trend of sustainable financial performance of state-owned enterprises is basically the same as that of the whole manufacturing industry, namely increasing, decreasing and increasing again, which is due to the impact of periodical factors, resulting in fluctuations. By eliminating the influence of periodical factors through filtering, we find that the long-term trend of the sustainable financial performance of state-owned enterprises is gradually declining, which indicates that the sustainable financial performance of state-owned manufacturing industry is not prominent in the fierce market and needs to be further developed and improved. (Note: The following table number omits 0, such as .72 stands for 0.72).

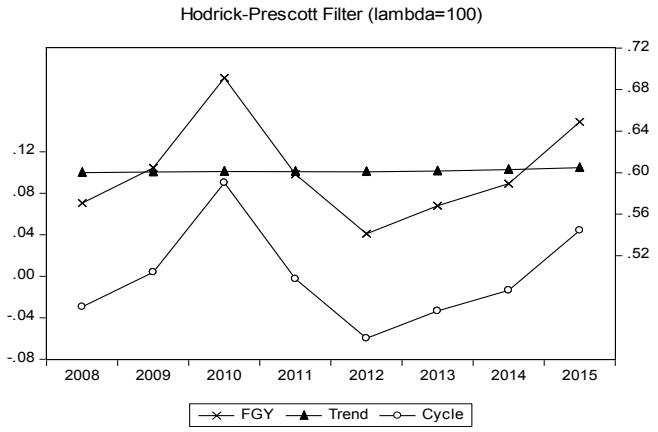

Figure 7. Filter depositions of the non-state-owned enterprises.

The line with × (FGY) in Figure 7 shows the sustainable financial performance of state-owned enterprises from 2008 to 2015, which is also an "N" type. It can be seen in Figure 7 that the long-term trend of sustainable financial performance of non-state-owned enterprises is slowly rising, which shows that the long-term trend of sustainable financial performance of non-state-owned manufacturing enterprises is stable and can resist the influence of various periodical factors. Compared with Figure 6, it shows that non-state-owned enterprises are stronger than state-owned enterprises in long-term trends of the sustainable financial performance because the former is slowly rising while the latter is declining.

It is shown in Table 10 that the sustainable financial performance of non-state-owned enterprises is significantly stronger than that of state-owned enterprises, while the stability of state-owned enterprises is stronger than that of non-state-owned enterprises. The reasons may be: Firstly, from the perspective of development status, non-state-owned enterprises dominate domestic investment demand. The leverage rate of non-state-owned enterprises has dropped significantly while the leverage rate of state-owned enterprises has increased significantly, and the return on equity from non-state-owned enterprises has been significantly higher than that of state-owned enterprises [35]. Secondly, from the perspective of management mechanisms, the management mechanism of the state-owned enterprises cannot effectively motivate employees, and the performance evaluation system is defective [36] Thirdly, from the perspective of financing, private enterprises face a larger obstacle on financing compared to state-owned enterprises, and the low level of private enterprises' management, the defective talent mechanism and others are the main reasons for the unstable development of private enterprises [37].

Table 10. Description of the statistics of state-owned enterprises and non-state-owned enterprises from 2008 to 2015.

	Maximum	Minimum	Average	Std. Dev.
State-owned	0.5548	0.4527	0.4884	0.0309
Non-state-owned	0.6913	0.5412	0.6016	0.045

5. Conclusions

This paper studies the sustainable financial performance of Chinese listed companies in manufacturing industry, dividing sustainable financial performance into several indictors, analyzing the weight of each indictor by an analytic hierarchy process, and determining the overall goal, namely the sustainable financial performance of enterprises. By using an HP filter to separate the long-term trend and the periodical trend of the sustainable financial performance of the listed companies, this paper finds that the long-term trend of the sustainable financial performance of China's manufacturing industry is relatively stable. Through comparison among industries, this paper finds that the sustainable financial performance of the pharmaceutical listed companies is the strongest, and that of the metal and non-metallic industries is the worst. Through interregional comparison, this paper finds that the long-term trend of the sustainable financial performance in the eastern and central regions is gradually rising, while in the west is declining; the stability of the central region is the best and the central region is growing rapidly. Through a comparison of ownership, this paper finds that the sustainable financial performance of non-state-owned enterprises is stronger than that of state-owned enterprises, and the long-term trend of the sustainable financial performance of non-state-owned enterprises is rising and that of state-owned enterprises is declining, but the sustainable financial performance of state-owned enterprises is more stable.

Through analysis of the long-term trend of sustainable financial performance of manufacturing industry in China, we can discover the influence caused by the differences among the development of various manufacturing sub-industries, the regional development and their ownership. Comparison of the development of sub-industries shows that there are significant differences among the sustainable financial performance in industries. Due to the lack of energy, and environmental issues, this paper may overestimate the sustainable performance of some industries. Therefore, in order to turn "Made in China" into "Designed in China" and comprehensively enhance the level of China's manufacturing sustainable financial performance, it is necessary to provide policy support and effective reform for those enterprises with inadequate sustainable financial performance. Regional development differences are mainly reflected in two aspects. On the one hand, the long-term trend of the overall sustainable financial performance of manufacturing industry is declining. On the other hand, the long-term trend of the eastern and central regions is gradually rising, while the long-term trend of the western region is declining. Therefore, in order to promote supply-side reform, to turn "Made in China" into "Designed in China", and to comprehensively enhance the level of China's manufacturing industry, we must intensify the efforts to support manufacturing industry in the western region and implement an effective reform program. The difference in ownership is that non-state-owned enterprises are preferable to state-owned enterprises. The sustainable financial performance of the former is slowly rising and that of the latter is gradually declining. Therefore, it is necessary to speed up reform of state-owned enterprises and promote the sustainable development capability of state-owned enterprises' performance because it is of great significance for deepening reform.

Acknowledgments: We thank the Fundamental Research Funds for the Central Universities for financial support (Project No. CDJKXB13006, 106112016CDJXY010005).

Author Contributions: All authors have read and approved the manuscript. All authors contributed equally to the development, and data acquisition for the present paper.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Qin, H. Research on sustainable development of gas enterprises from the perspective of Finance: Based on the data analysis of Listed Companies in Shanghai and Shenzhen A shares. *Mo. Econ. Inf.* **2015**, *19*, 154–155. (In Chinese)
2. Wang, D.; Chen, R. Financial performance evaluation of mineral resources listed companies: based on the perspective of sustainable development. *Friends Account.* **2014**, *26*, 25–30. (In Chinese)
3. Wang, J.T.; Wu, R.J.; Wang, J.J. Analysis of dairy listed company performance and sustainable development policy recommendations. *Financ. Econ.* **2010**, *16*, 76–79. (In Chinese)
4. Searcy, C. Corporate sustainability performance measurement systems: A review and research agenda. *J. Bus. Ethics* **2012**, *107*, 239–253. [CrossRef]
5. Dyllick, T.; Hockert, K. Beyond the business case for corporate sustainability. *Bus. Strategy Environ.* **2002**, *11*, 130–141. [CrossRef]
6. Marrewijk, M. Conceptions and definitions of CSR and corporate sustainability: Between agency and communion. *J. Bus. Ethics* **2003**, *11*, 95–105. [CrossRef]
7. Lourenço, I.C.; Branco, M.C.; Curto, J.D.; Eugénio, T. How does the market value corporate sustainability performance? *J. Bus. Ethics* **2012**, *108*, 417–428. [CrossRef]
8. Morioka, S.N.; Carvalho, M.M. Measuring sustainability in practice: Exploring the inclusion of sustainability into corporate performance systems in Brazilian case studies. *J. Clean. Prod.* **2016**, *1*, 123–133. [CrossRef]
9. Searcy, C.; Karapetrovic, S.; McCartney, D. Designing sustainable development indicators: Analysis for a case utility. *Meas. Bus. Excell.* **2005**, *9*, 33–39. [CrossRef]
10. Ferguson, D.L. Measuring Business Value and Sustainability Performance. *Eur. Acad. Bus. Soc.* **2009**, *5*, 1–55.
11. Sarkis, J.; Cordeiro, J. An Empirical evaluation of environmental efficiencies and firm performance: Pollution prevention technologies versus end-of-pipe practice. *Eur. J. Oper. Res.* **2001**, *135*, 102–113. [CrossRef]
12. Filbeck, G.; Gorman, R. The relationship between environmental efficiencies and financial performance of public utilities. *Environ. Resour. Econ.* **2004**, *29*, 137–157. [CrossRef]
13. Triebswetter, U.; Hitchens, D. The impact of environmental regulation on competitiveness in the German Manufacturing industry: A comparison with other countries of the union. *J. Clean. Prod.* **2005**, *13*, 733–745. [CrossRef]
14. Tahir, A.C.; Darton, R.C. The process analysis method of selecting indicators to quantify the sustainability performance of a business operation. *J. Clean. Prod.* **2010**, *18*, 1598–1607. [CrossRef]
15. Liliana, N. The relationship between corporate social responsibility (CSR) and sustainable development (SD). *Intern. Audit. Risk Manag.* **2015**, *1*, 179–190.
16. Xin, J.; Li, Xiaoping. On sustainable development of enterprises and corporate social responsibility. *J. Cent. South Univ. For. Technol.* **2013**, *3*, 77–80. (In Chinese)
17. Engen, M.; Cristina, A.; Constantin, Z. Measuring corporate sustainability performance. *Sustainability* **2015**, *7*, 851–865.
18. Tao, Y.; Xiao, F. Research on the comprehensive evaluation index of sustainable development of resource listed companies in Inner Mongolia. *Friends Account.* **2016**, *12*, 93–98. (In Chinese)
19. Higgins, R.C. How much growth can a firm afford? *Financ. Manag.* **1977**, *6*, 10–15. [CrossRef]
20. Qiu, Y. Research on theory and method of financial evaluation for suitable development of enterprises. *Sichuan Univ.* **2007**, *5*, 20–25. (In Chinese)
21. Shi, H.G.; He, J. Evaluation of sustainable development ability of listed companies. *Bus. Times* **2010**, *9*, 47–48. (In Chinese)
22. Bai, Q. Evaluation of sustainable development ability of listed companies in China. *J. Beijing Univ. Posts Telecommun.* **2011**, *5*, 10–15. (In Chinese)
23. Cao, X.X. Evaluation of sustainable development capability of enterprises based on regional difference coefficient. *Chongqing Univ.* **2014**, *4*, 8–12. (In Chinese)
24. Su, D.W.; Wu, Y.R. Econometric model and empirical analysis of sustainable development of Chinese listed companies. *Econ. Res. J.* **2005**, *1*, 106–116. (In Chinese)
25. Yao, L.S.; Yang, L.Y.; Zhang, X.Y. Sustainable development index system of listed companies. *Financ. Account. Mon.* **2009**, *15*, 55–57. (In Chinese)

26. Yao, L.S.; Wu, H.B. Research on board governance and sustainable development of listed companies. *Econ. Manag.* **2009**, *2*, 31–34. (In Chinese)
27. Ye, D.M. Evaluation of sustainable development ability of listed companies. *J. Beijing Univ. Posts Telecommun.* **2010**, *5*, 9–12. (In Chinese)
28. Jensen, M.C.; Meckling, W.H. Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure. *J. Financ. Econ.* **1976**, *3*, 305–360. [CrossRef]
29. Yu, P.; Wang, J.J. Study on the development path of sustainable China manufacturing industry under the new norm based on the "global factory" perspective. *Contemp. Financ.* **2015**, *7*, 98–107. (In Chinese)
30. China Industry Information. Analysis of Favorable Factors for the Development of Pharmaceutical Industry. Available online: http://www.chyxx.com/industry/201607/434202.html (accessed on 30 April 2017). (In Chinese)
31. Li, G.D.; Fang, C.L. Regional economic growth differences Chinese research progress and prospect. *Prog. Geogr.* **2013**, *7*, 1102–1112. (In Chinese)
32. Guo, J.; Xu, Y.Z.; Wang, S.B. FDI location change and the interregional transfer of manufacturing industry: Empirical evidence based on Provincial Panel Data. *Int. Invest. Manag.* **2014**, *10*, 12–21. (In Chinese)
33. Wang, L.F; Duan, W.J.; Lai, M.Y.; Liu, L.J. A quiet regional and industry Chinese manufacturing energy-saving potential difference. *Geogr. Res.* **2015**, *1*, 109–121. (In Chinese)
34. Wang, J.Y.; Guo, Q.; Zhou, Y.; He, C.F. Impact of market segmentation on Chinese manufacturing growth: regional and industrial differences. *Prog. Geogr.* **2013**, *11*, 1592–1601. (In Chinese)
35. Liang, H. Chinese Enterprises' "Shuangcheng": Comparison between States Owned Enterprises and Non-State Owned Enterprises. Available online: http://comments.caijing.com.cn/2014-03-04/113977063.html (accessed on 30 April 2017). (In Chinese)
36. Luo, H. On the management system of modern state-owned enterprises with Chinese characteristics: Incentive and restraint system and performance rating system. *Fujian Forum Humanit. Soc. Sci.* **2016**, *1*, 191–197. (In Chinese)
37. Zhang, X.Y. Overview of the development of private enterprises in China. *Intern. Audit. China* **2012**, *10*, 12–17. (In Chinese)